

#	Section	Page	EPA Comment	LDWG Response
1.	General	n/a	<p>EPA comments reiterate several issues raised in past discussions and comments, including the following:</p> <ul style="list-style-type: none"> <li>the carbon pilot plots are a study, not remedial action;</li> <li>recovery category boundaries from the RI/FS are unlikely to match real world morphology and should be identified as an uncertainty that may need to be resolved by merging RC1 areas or showing the effect of the uncertainty.</li> <li>concentrations in RAL intervals that are close to the RAL (0.9 or higher) should at least be used to guide sampling to encompass remediation areas, to avoid construction phase surprises;</li> <li>locations with deep contamination where surface intervals (0-10, -60, -45 cm) are below RALs warrant consideration of how contamination got where it is and of the potential benefits (reduced long term cost and ICs) of complete removal;</li> <li>dry weight concentrations of PCBs in intervals with and without RALs should be considered as part of the weight of evidence when drawing boundaries, and/or large contingencies included in the cost estimate in case areas with RAL exceedances are found to be larger during construction.</li> </ul> <p>Focusing on the letter of the ROD could leave uncertainties at the end of design that may increase costs during remedial action or result in unexpected results in long-term monitoring and increased monitoring costs.</p>	<p>General comments noted and addressed in the draft final QAPP Addendum.</p> <p>Regarding the recovery category boundaries, they were re-evaluated as part of the PDI QAPP (Appendix B) and QAPP Addendum (Phase II) Attachment C, based on the criteria presented in ROD Table 23. PDI QAPP Appendix B noted that the recovery category areas provide a general representation of the location-specific conditions within the upper reach for the purpose of applying RALs and remedial technologies. Remedial design will consider uncertainties when developing Remedial Action Areas.</p>

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2.	General	n/a	<p>This document summarizes and evaluates the data from Phase 1 with a focus on the design. While it serves as an effective bridge to the Phase 2 QAPP, its primary function, the focus on RALs means that it doesn't discuss the data in terms of overall contamination levels and distribution. This report should include an overview of what patterns we are seeing in the upper reach and why.</p> <p>Enumeration of the numbers of RAL exceedances per segment aren't very meaningful.</p> <p>Add some overall descriptive language and graphics about the sampling results and other data and what they say about the extent of contamination relative to what was known in the RI/FS. For example, explain what is happening in Slip 6, what we know about areas near Boeing Plant 2, where shoaling material comes from.</p> <p>Describe how the purple boxes (cores without RAL interval data) and where the cleanup (which, in keeping with the ROD , focuses on specific near-surface intervals) may leave high PCB concentrations below the RAL intervals, given the results of the sampling to date.</p>	<p>Maps with dry weight data have data have been added to Attachment A of the draft final QAPP Addendum. These maps provide an overview of patterns of contaminant levels and distribution in the upper reach.</p> <p>"Purple box" data have also been included in Attachment A of the draft final QAPP Addendum.</p> <p>Descriptive language based on these maps and data has not been prepared because the Phase I DER will not be revised. Instead the patterns and data were considered by LDWG and EPA in selecting Phase II sampling locations, with rationale provided in Attachment I of the QAPP Addendum.</p>

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3.	General	n/a	Explain the process for estimating areas above the RAL more clearly in the text, rather than Appendix J. In addition, EPA requests that LDWG provide a summary of the process in Appendix J in a basic, visual handout for the Roundtable?	<p>See response to DER comment 113. As discussed with EPA on April 26, Appendix J was attached to the draft final QAPP Addendum (as Attachment E) with few revisions. It has served its purpose of helping to identify Phase II data gaps.</p> <p>The interpolation approach will be discussed in more detail with EPA over the summer and finalized with EPA prior to preparing the Phase II DER. The Phase II DER will explain the final interpolation process. In addition, the Phase II DER will present the RAL exceedance areas using the final interpolation approach with the design dataset including the Phase II data.</p> <p>Please let LDWG know if a basic interpolation handout is needed to support this fall's Roundtable meeting, what questions needs to be addressed, and when you would like to receive the draft handout.</p>

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4.	General	n/a	<p>Coordination with the Corps of Engineers will be increasingly important. EPA has noted that it is crucial to understand the uncertainty in the interpolation of results. Interpolation uncertainty is important not only for confidence that contaminated sediments are addressed but for communicating with the COE about uncertainties in areas of unremediated channel sediments. This will help inform characterization needs prior to maintenance dredging.</p> <p>While LDWG has the archived z-layer samples from the FNC collected in Phase 1, EPA recommends that a subset be analyzed in areas outside of the RAL exceedance areas, particularly if the data or conceptual site model suggests potential contamination at depth.</p> <p>Where overlying shoaled materials meet PSDDA requirements, the COE does not typically analyze the z-layer, but given the site history, is it possible that this layer is contaminated? Contamination at this depth, if present, could show up as an issue in site long-term monitoring.</p>	<p>As discussed with EPA, archived Z-layer samples outside of RAL exceedance areas will not be analyzed because the vertical extent of contamination at these locations was characterized during Phase I.</p> <p>RAL exceedance areas within the shoaled FNC area that contain subsurface exceedances will be further delineated in Phase II.</p>
5.	General	n/a	<p>Table 4-7 was a useful precursor to the QAPP. EPA is providing comments on Table 4-7 and expects to see a response to comments and revisions. However, since it will likely be challenging to continuously align Table 4-7 with revisions of the QAPP, EPA recommends addition of disclaimer language on of Table 4-7 revisions and will exclude Table 4-7 from EPA's approval of the DER. (this comment is made again on Table 4-7)</p>	<p>Table 4-7 has been updated and attached to the QAPP Addendum in Attachment F. In this revised form, the table has been simplified to provide less detail and the last column has been deleted to make the process more streamlined. The last column is no longer needed because the QAPP Addendum addresses where additional samples will be collected.</p>

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6.	General	n/a	<ul style="list-style-type: none"> <li>DRCC requests that LDWG assess vertical contamination thoroughly and address contamination even if it is slightly below the RAL. DRCC has heard that, had slightly more cleanup been done, the Hudson River cleanup would have achieved better outcomes for human health (fishing, sediment contact). EPA is not certain of the source of this perspective, but EPA agrees that, while the ROD establishes the requirements for cleanup, LDWG should consider how the design can identify and potentially encompass ROD-compliant areas next to RAL exceedance areas, to reduce uncertainty, improve or accelerate environmental outcomes, and avoid construction and post- construction surprises.</li> <li>Consider construction phase sampling and what conditions could result in an expanded lateral footprint. Including coring and sampling in Phase II beyond the RAL exceedance area would allow tiered 2 analysis in the event that Tier 1 vertical characterization suggests significant contamination that may extend beyond the footprint defined by RAL comparisons. Could this avoid an unacceptable data gap for 30% design?</li> </ul>	<p>LDWG acknowledges EPA's comments about remedial design philosophy and will be working closely with EPA during 30% RD to achieve the ROD's requirements.</p> <p>Regarding vertical data acquisition in Phase II, LDWG and EPA have reviewed the sampling design and added additional Tier 2 locations where appropriate to minimize any need for vertical data in Phase III.</p> <p>With respect to construction phase sampling:</p> <ul style="list-style-type: none"> <li>Construction verification sediment sampling will be developed during RD and is conducted to verify that RALs are met within dredge areas and determine whether residuals management is required inside or outside of remedial action areas. Construction verification sediment sampling typically is not conducted to verify that the horizontal boundaries established through the PDI and design process are accurate.</li> <li>The ROD does not require delineation and remediation of buried deep contamination below the RAL intervals (0-45 cm in intertidal, 0-60 cm in subtidal) since the ROD determined that buried contaminated sediment below the RAL intervals should not be exposed.</li> </ul>
7.	General	n/a	Where contaminant levels are slightly above or slightly below the RAL, additional sampling should be done. A PDI sample with results that are close to but not above the RAL may be next to but not included in a cleanup area, but post-construction verification sampling may show levels above the RAL due to spatial variability. Predesign sampling to improve confidence in the representativeness is a modest investment to avoid unexpected construction cost increases.	Sampling locations in the QAPP Addendum includes consideration of additional analytes/sampling locations where EF > 0.9, and additional sample locations have been discussed with EPA during development of the draft final QAPP Addendum. See the draft final QAPP Addendum for locations.

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8.	General	n/a	The use of EFs is reasonable for defining RAL exceedance areas for design purposes. However, the difference in RALs means that the EFs obscure contaminant distribution patterns. Add figures showing (with 'heat maps' or colored dots for ranges of dry weight concentrations for PCBs and the other human health COCs in surface and subsurface samples. For shoaling areas, consider using "stick logs" to show the results at different depths on one figure).	Maps with surface and subsurface dry weight concentrations of PCBs, cPAHs, arsenic, and dioxins were sent to EPA on April 29, 2021, and attached as Maps A-6a to Map A-13b to the draft final QAPP Addendum in Attachment A. The subsurface maps provide data (within the yellow-rimmed squares) for the shoaling interval with the highest concentration.
10.	General	n/a	Add text describing when and how cap thickness will be determined for areas where partial dredging may apply. The ROD estimates three feet of cap in subtidal areas and four in intertidal areas, but dredging depth, cap thickness or cap design may have to be adjusted depending on contamination in underlying sediment. Add text to verify that the vertical characterization proposed in the QAPP will be able to distinguish where an additional foot of dredging/removal would remove all sediments above the RAL.	As stated in the ROD (Section 9.3), cap thickness will be determined during RD. 30% RD will also determine which areas are proposed for partial dredging and capping and will use standard design methodology for engineered caps as described in the Remedial Design Workplan Section 3.7.2. Text has been added in the QAPP Addendum to note that the vertical extent sampling will be able to identify where there is one foot or less of contaminated sediment below a proposed cap.
11.	General	n/a	Given areas with mixed technology assignments and the potential that technology assignments will change depending on the results of lateral and vertical characterization, verify that the engineering/geotechnical aspect of the QAPP will provide data applicable to such areas. If not, it may be prudent to gather relevant information specific to such areas, rather than potentially having to remobilize in Phase 3.	The existing geotechnical data and proposed engineering and geotechnical data collection in Phase II are considered sufficient to design the different remedial technologies at each RAL exceedance area.  The Phase II geotechnical study results will define the expected engineering behavior of subsurface horizons over generally broad lateral extents and, as such, the data collected will be useful not only for RAL exceedance areas, but for locations adjacent to RAL exceedance areas.

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13.	1.1 Phase I Data Evaluation Report Objectives		<p>'Phase II will also involve collection of characterization data in bank areas that are within areas with RAL exceedances <b>or are potential sources to them</b>, geotechnical data, and area-specific engineering data needed for RD.'</p> <p>Limiting the data collection to banks "within" a RAL exceedance area narrows the approach, omitting bank areas that might be a contaminant source to an area exceeding the RAL but that are not within it. The approach may leave data gaps. For example, due to the outline of Recovery Category 1 near National Industrial Holdings (RM3.9-4.1), the shoreline is not within Area 28. What do we know about the bank or other sources to Area 33? Area 36's fragment, and parts of Area 37 may have sources on the banks.</p>	<p>Phase II sampling locations are presented in the draft final QAPP Addendum based on discussions with EPA on April 26 and 28, 2021.</p> <p>Information near banks noted in EPA comment:  Area 28: Sediment sample with 6.2 mg/kg OC to W of RC 1.  Area 33: All samples &lt; RALs to W of Area 33.  Areas 36 and 37: Bank sampling proposed.</p>
14.	1.1 and 3.1	3 and 23	The term geostatistical implies kriging. IDW is a deterministic method not a geostatistical method. Unless LDWG already knows that kriging will be the final interpolation method I would suggest removing the word.	Comment acknowledged, but no action needed as not revising the draft Phase I DER. The term geostatistical was not used in Attachment E of the draft final QAPP Addendum.
16.	1.2 final para	Pdf 11	Revise as follows, because the QAPP may include/exclude items on Table 4-7, following review: "Phase II DQOs, as discussed in Section 4, will be met through Phase II sampling in order to fill data gaps. <b>Preliminary data gaps are identified in this DER</b> . Details of the Phase II sampling will be <b>provided outlined</b> in the upcoming QAPP Addendum."	Comment acknowledged, but no action needed as not revising the draft Phase I DER. A summary of the Phase II data gaps is provided in Table F-1 of Attachment F (i.e., revised DER Table 4-7) to the draft final QAPP Addendum. Also, see response to general comment 5.
17.	2.1.1 last bullet, Table 2-2	Pdf 14	The two z-layer samples that could not be collected are a data gap, particularly if other samples analyzed were below RALs. How will this be filled? Consider the location and whether the cores were located in native material an area where the channel was cut.	<p>Per QAPP Addendum:</p> <ul style="list-style-type: none"> <li>Area 9 will have vertical data collected in Phase II, which will fill data gap (a Z-sample could not be collected at Phase I location 148).</li> <li>There was no need analyze a Z-sample at Phase I location 201 because there were no RAL exceedances in sample 201B. Note also that this location is adjacent to Area 13 where vertical data are being collected.</li> </ul>

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18.	2.1.1	Pdf 14	Photos of surface/sediment grab and subsurface core samples are not provided in Appendix A. Appendix A provides the disclaimer "Photographs Available via CD upon request". Consider changing language in DER 2.1.1 pg 7 when referencing the information to Appendix A.	Comment acknowledged, but no action needed as not revising the draft Phase I DER. Photographs have been uploaded to ldwg.org as part of the Phase I data package.
19.	2.1.2.1	Pdf 14	"Laboratory and validation reports are provided in Appendix B". Appendix B is a 1 pg document with the disclaimer "Available via CD upon request". Consider changing language in 2.1.2.1 to reflect this.	Comment acknowledged, but no action needed as not revising the draft Phase I DER. The laboratory and validation reports have been uploaded to ldwg.org as part of the Phase I data package.
20.	2.1.2.1	Pdf 14	"Laboratory and validation reports are provided in Appendix B". Appendix B is a 1 pg document with the disclaimer "Available via CD upon request". Consider changing language in 2.1.2.1 to reflect this.	See response to DER comment 19.
25.	Table 2-4 and 2.1.2.2	Pdf 18 19	For Note 4. "One grain size sample was accidentally disposed of..." and the third deviation listed-. Note whether or not these gaps will be filled/collected in subsequent sampling events.	No changes made to Table 2-4 and Section 2.1.2.2 because the Phase I DER is not being revised. From a design perspective, the grain size data collected to date are sufficient to support design and re-collecting this grain size sample is not needed. This location is surrounded by other locations with grain size data. The locations of Phase I grain size data are mapped in Attachment A of the draft final QAPP Addendum.
31.		Pdf 21	The COE will eventually dredge unremediated shoaling areas. Consider analyzing selected samples from the z-layer outside the RAL exceedance areas to ensure that routine dredging doesn't expose deeper contamination, if it may be present. EPA anticipates a thoughtful approach to vertical sampling in shoaling areas in the QAPP. DMMP will require thorough characterization of shoaling areas that are not remediated, not the minimum required by DMMP. What is the likely course of events if contamination is found? LDWG should consider a contingency plan in the event that this characterization identifies RAL exceedances.	See response to comment 4.  All RAL exceedance areas with subsurface contamination have vertical extent cores. One Z-layer sample will be analyzed in Phase II in Area 20 because the vertical extent cores in this area is in the intertidal.



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34.	2.1.3	Pdf 23	Why are there no boxes or triangles used to identify 0-45 cm and 0- 60cm data in <b>Map 2-3c</b> ?	This map, which is now included in Attachment A to the QAPP Addendum, has been corrected.
40.	3.1 item 2		Last bullet: If the core is outside an interpolated RAL exceedance area, present the data in an appendix, compared to Recovery Category 1 RALs. This is a check step to identify potential data gaps.	The purple square data and map have been included in Attachment A of the QAPP Addendum and were considered in the placement of Phase II samples.
41.	3.1 Item 5	Pdf 30	Clarify surface <b>0-10 cm</b> in the first sentence of text. For transparency, present the results of collocated samples (within 10' or less) relative to the RC1 RAL in the appendix. If the new results change the determination from > RAL to < RAL, this needs to be highlighted. The temporal and spatial variability is not well quantified.	A table with co-located 0-10 cm data has been added to Attachment A of the draft final QAPP Addendum.
42.	3.1	31	While inclusion of the field duplicate when it exceeds the RAL for PCBs makes sense, will you also check and report if other chemicals (in either sample) exceed the RAL? This may affect analytical decisions.	The data management rules in Attachment D of the draft final QAPP addendum describe the evaluation of field duplicate results. The field duplicate results are compared to the RALs for all chemicals. If the field duplicate exceeds the RALs for any chemical and the parent sample does not have a RAL exceedance then the field duplicate results are selected. The results for the parent sample and the field duplicate sample are both retained in the LDW database.
46.	3.2	25	It should be noted that the concentration of PCBs increased more than 50% in the four intertidal locations. Clarify whether those increased concentrations caused any adjustment of recovery category in those areas.	Discussed in QAPP Addendum Attachment C (updated version of DER Appendix I).
48.	3.3.1	Pdf 33	Provide more description of the two interpolation methods used. Briefly explain why different methods were used to delineate RAL exceedances areas, inverse distance-weighted interpolations for PCB versus Thiessen Polygons for other COCs.	See response to DER comment 113. As discussed with EPA on April 26, Appendix J (interpolation methods) was attached to the draft final QAPP Addendum (as Attachment E) in its current form without additional detail. Modifications were made to note why Thiessen polygons were used for other COCs (interpolation needed for small areas).

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49.	3.3.1, FN12, maps	Pdf 33	This section (Defining Areas with RAL exceedances) and FN 12 cite ROD RALs, only. The maps show areas that assume the proposed ESD RAL for cPAHs. Until the ESD is signed, the applicable RAL is in Table 28. Either show areas based on current RALs with a footnote about the potential change (preferable) or explain why the cPAH RALs in the proposed ESD were used.	See response to QAPP Addendum Comment 14. RAL exceedance factors and salmon-colored areas in QAPP Addendum maps are based on the cPAH ESD RALs. Orange RAL exceedance areas have also been added to show the extra area that would be defined using ROD cPAH RALs (pending ESD resolution).
50.	3.3.1	Pdf 33	See Appendix J comments for more context. Clarify whether or how, and why, the interpolation methods differ from interpolation methods used in the Final FS (AECOM 2012).	See response to DER comment 113. The interpolation methods used to determine Phase I RAL exceedance areas for PCBs (IDW), benthic COCs (Thiessen polygons), and dioxins/furans (Thiessen polygons) were the same as those used in the final FS. Thiessen polygons were used for arsenic and cPAHs in the RAL exceedance areas, whereas IDW was used in the final FS. This decision has little effect on the RAL exceedance areas in the highly localized areas with arsenic and cPAH RAL exceedances.
51.	3.3.1 and 4.1.1	26 and 32	The preliminary nature of the interpolation model is a data gap. Add this to the list of data gaps in the DER. We currently do not have data related to the prediction accuracy and uncertainty of the model. This gap will be filled in Phase II by generating data related to the prediction uncertainty and accuracy and using that data to inform the development final contamination boundaries.	The interpolation model has not been identified as a data gap in the draft final QAPP Addendum. The interpolation approach will be discussed in more detail with EPA over the summer and finalized with EPA prior to preparing the Phase II DER. In the Phase II DER, the RAL exceedance areas will be presented using the final interpolation approach with the design dataset including the Phase II data.
52.	3.3.2, FN14	Pdf 34	Note in text that, for cases where multiple remedial technologies apply, any simplification (e.g. choosing one technology) will favor the action that leads to removal, such as dredging). FN 14 does not refine the ROD's "area-specific technology" for cleanup under structures. How will Phase 2 data assure that the necessary data are collected for such areas? Add partial dredge and cap as a potential remedial technology in the bullets for subtidal areas and note that the ROD can require removal of an additional foot if that will achieve the RALs.	The Phase I DER remedial technologies assignments listed potential technologies that may be applied within a RAL exceedance area. The remedial technology selection will be developed in 30% RD and reviewed and require approval by EPA. See response to QAPP Addendum comment 5 for additional information on technology assignments.  Bulleted list has been updated in the QAPP Addendum (omission of partial dredge and cap was accidental).

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53.	3.3.2	Pdf 35	Example 1. Area 8 is located below -10 ft MLLW in the subtidal area within FNC. Since habitat areas apply for areas shallower than -10 ft MLLW, does habitat area apply here? Check and correct, if not, or explain.	Habitat area does not apply here but “dredge (with backfill in habitat areas)” is the terminology used in the ROD Revised Fig 20 flow chart. No change needed as draft Phase I DER is not being revised.
56.	3.3.2	Pdf 36	For the Area 7 subtidal example, the answer to “Room for a cap or ENR?” is given as yes, but it seems like additional data are needed to determine the answer. Clarify why in this case there’s room for a cap (are there no applicable depth restrictions?)	Area 7 subtidal area is considered outside of the navigable portion of the waterway because the subtidal area is located west of the South Park Bridge western pier. Navigation in this area is constrained by the presence of the South Park Bridge western pier, the deflector structure, and shallow water depths.
58.	4.1.1	32	Bullet #2: “Collect additional data around the interpolated boundaries of areas with RAL exceedances, where needed to supplement the design dataset.” Further develop this statement to include an explanation of why an area is considered bounded or unbounded (i.e. expand on the explanation of when more samples are required for bounding). There are instances where exceedance areas with dense sample coverage (Areas 7 and 18) are considered unbounded, while exceedance areas with less sample density (Area 24) are considered bounded. Is an exceedance area unbounded if there is not a clean sample within a certain distance, and if so, what is that distance? Should the recovery category be a factor in the distance? Perhaps bounding distances should be closer and more conservative in recovery category 1 areas. If professional judgment is being used instead of systematic rules, explain how judgments are being made. It is important for EPA to understand exactly what criteria LDWG is using to flag an area as bounded or unbounded (and thus requiring additional samples), even if the criteria differ case by case.	Phase II locations were discussed with EPA on April 26 and 28 and are presented in the draft final QAPP Addendum.  Professional judgement was used in Phase II sample placement to consider patterns in existing data as well as elevation contours. In general, locations for a given RAL interval were not placed within 50 ft or further than 100 ft of one another in critical areas.

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59.	Table 4-1	Pdf 38	<p>DQO 12 – Is it known where sediment below caps will remain? If not, perhaps DQO12 is to delineate depth of contaminated sediment to determine where dredging (complete) applies versus partial dredge and cap AND to identify contaminated sediments that may be left behind (as they are more than a foot deeper than likely cap thickness). *NB: Characterizing the full depth of contamination will help evaluate the merits of complete removal (whether the ROD requires it or not). EPA encourages LDWG to collect data for this purpose.</p> <p>Note 1: This note mentions biological testing to override RAL exceedance. The QAPP will of course specify plans, but provide some information here, such as whether resampling would be required at the same location and whether lateral bounding samples would also be collected and tested. If the Phase 2 sample is below the RAL, when the Phase 1 sample was above, what happens? Will archived bounding samples be collected in case the sample does not test out?</p>	These comments have been addressed in the draft final QAPP Addendum. See response to QAPP Addendum Comment 13.
61.	4.1.2 ENR/AC Pilot Study Intertidal Plot	Pdf 39	<p>For calculation of the maximum “0-45 cm” COC concentrations, EPA does not believe the pre-construction 0-10 cm data can be used to represent the rest of the 45 cm interval below (i.e. the 10-20 cm interval). There is a possibility that the COC concentrations in the pre-construction 10-20 cm interval are much higher than the 0-10cm interval. Add to Table 4-7 that the 45 cm interval in the pilot plots is a data gap.</p>	Comments on the ENR/AC Intertidal plot have been addressed in the draft final QAPP Addendum. See response to QAPP Addendum Comment 65. Both 0-45 cm intervals (from the current mudline surface and from the base of the ENR layer) will be analyzed at four locations within the ENR/AC plots, and one 0-45-cm sample will be collected from the current mudline surface where pre-construction 0-45-cm data exist.

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62.	4.1.2 ENR/AC Pilot Study Intertidal Plot	Pdf 39	<p>This section crosses into plans for sampling, which are set forth in the QAPP. While this states that samples are proposed near the plot, EPA believes a single Phase 2 sample within the carbon pilot plots, based on extrapolation, is not sufficient, for a number of reasons.</p> <p>This section should be qualified in anticipation of the QAPP or deleted.</p> <p>What CSM or data supports inferences about the distribution of contamination in the plots and surrounding areas? Adjacent sediment areas require cleanup. On the south side of the southern plot, a PCB exceedance factor of 20 was observed. Between the plots and around the plots, many sample locations have EFs between 3 and 9. Both plots are adjacent to MTCA sites.</p> <p>Does the CSM support a clear distinction between the rectangles where the carbon pilot ENR plots were constructed and areas surrounding them?</p> <p>EPA and LDWG have not discussed long-term monitoring of the plots, but if LDWG considers these pilot study plots to be like early action areas, monitoring will be required to verify continued stability at a minimum. Monitoring to verify that they are compliant with the ROD in all RAL intervals will likely be required.</p> <p>The conclusions in the section rely on assumed conditions for the deepest 10 cm of the 45 cm interval (including the pilot study later). How much uncertainty is in the average thickness of 25 cm? If the cover were 20 cm or 15 cm thick, might the underlying 10 cm sediment interval (extrapolated to the deeper 10 cm interval) cause an exceedance of the RAL for 0-45 cm?</p> <p>As previously noted, The ENR plots are for a pilot study, not for remediation. ENR is not a cap. Some of this area was shown as dredge or partial dredge and cap in the ROD. Some of this area has low deposition rates and border on areas subject to high flow scour (with uncertainty in the boundaries). Has this area</p>	<p>See response to DER Comment 61 and draft final QAPP Addendum Section 4.1.2.1 re sampling plans discussed with EPA.</p> <p>All of the PCB and arsenic data collected prior to the construction of the pilot plots have been compiled and provided in Attachment A of the Phase II QAPP Addendum.</p> <p>The existing data for the intertidal plot have shown that the ENR and ENR+AC layers have been stable following construction. In the three years since construction, there have been six events above the 2-year flood level (8,400 cfs), including a flow event at 10,300 cfs, which is just below the 10-year flood level of 10,800 cfs.</p> <p>The average thickness of 25 cm for the ENR layer was based on the thickness of the ENR layer measured at 18 locations within each of the Intertidal plot following construction. The average thickness in the ENR subplot was 27.9 cm (10.9 inches) and the average thickness in the ENR +AC subplot was 24.8 cm (9.7 inches). For both plots 63% of the locations had greater than 23 cm (9 inches) of material.</p> <p>Phase II PDI will contribute data that will be discussed with EPA to determine what monitoring and other measures are appropriate.</p>
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			<p>been subject to high flow at low tide since the pilot plots were constructed?</p> <p>If LDWG is correct that the 0-45 cm compliance interval is below RALs, this can and should be demonstrated with data. EPA acknowledges the investment LDWG made in the study, but the pilot study was not built with explicit expectations that further remediation would not be necessary. Chemical and other information is needed to support leaving the pilot plots as is.</p>	
63.	4.2 Banks (DQO 11)	Pdf 41	<p>This talks about banks WITHIN RAL exceedance areas. Need to consider “near” too, especially banks that could erode or need stabilization. Which banks are considered “subject to erosion” should consider future land uses (such as maintenance and repair, berths and vessel use, development and adjacent site cleanups) and sea level rise. How have these questions been factored in?</p> <p>This focuses on chemistry data only. Did LDWG review site/bank fill history, outfalls, and potential changes to banks in future (as cleanup, restoration, and/or repairs/redevelopment occur)?</p>	<p>See response to DER comment 13.</p> <p>None of the banks within or immediately adjacent to RAL exceedance areas exhibited signs of erosion. Banks near, but not within, the RAL exceedance areas will be looked at during RD since remedial action around banks need to leave a stable condition.</p> <p>The DER focused on whether there are data gaps that need to be addressed through field collection efforts. Other factors that may impact remedial design if remedial action on banks is required will be obtained during 30% RD through discussion with Ecology Site Managers (if bank area is within MTCA site) and property owners. The QAPP Addendum outlines field data collection, including topographic survey data, bank features, geotechnical data, sediment thickness over armor layer, and sediment chemistry.</p>
64.	4.2 Banks (DQO 11)	Pdf 41	<p>Vertical chemical information is not proposed if the preliminary assignment isn’t dredging. But if Phase 2 lateral sample results change the technology assignment to dredging, Phase 3 sampling results may be too late for design. Archiving and tiered analysis may be the solution.</p> <p>Clarify whether the term “vertical” used here means deeper than 60 cm/45 cm?</p>	<p>Vertical extent refers to deeper than 60 cm/45 cm. LDWG and EPA discussed each area and additional Tier 2 cores were added as appropriate to minimize the need for Phase III vertical data. See responses to QAPP Addendum comments 5 and 25.</p>

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65.	4.2 Banks (DQO 11)	Pdf 42	State why a <b>different</b> data gap would be identified if the RAL exceedance is surface only (10 cm) or an intertidal/subtidal sample (45/60 cm). If this is based on sampling which doesn't have statistical basis, what is the uncertainty? And what if horizontal / vertical information casts doubt on the assumption (is this then a Phase 3 data gap?)	See responses to QAPP Addendum comments 5, 20, and 25 regarding vertical data in likely ENR areas or areas with thin-cuts.
66.	4.2.1 Horizontal RAL Exceedance Refinement for Banks	Pdf 45	<p>First sentence refers to banks below MHHW. Confirm that the definition of banks does not exclude areas below MHHW. Describe the coordination that is ongoing for upland sites. Ecology may be able to help identify pending sites or cleanups, or areas of low concern.</p> <p>For armored areas, justify the focus on 10 cm for interstitial materials. "Interstitial" doesn't seem to get at the material on top of the armor. What control action might be supported by sampling of interstitial material? Would it make sense to collect composite data? What does "below" the bank mean?</p> <p>Describe how AOC3 DER bank data were considered. Be explicit that other bank data (from prior sampling) were considered, if so. "Data compiled" suggests that all bank data were considered. "Specifically" sounds like the follow-on to the final sentence (about how AOC3 data were considered) in the previous paragraph, but it's not.</p>	<p>LDWG confirms that banks include areas below MHHW.</p> <p>LDWG has coordinated with upland Ecology site managers in the upper reach to request information related to bank data, including sediment chemistry, geotechnical data, and groundwater information. Additional coordination with upland site managers will take place during 30% RD to coordinate potential remedial action on applicable banks that may be impacted by upper reach remedial action.</p> <p>Interstitial was intended to imply any sediment overlying the armor layer or located in the gaps between large riprap. Interstitial data is surface data (0-10 cm) and will be used similarly to other 0-10 cm surface data to help refine horizontal extents through interpolation. Composite samples could not be directly used in interpolation so are not recommended.</p> <p>Below the bank refers to waterward of the toe of the bank.</p> <p>Bank data considered in horizontal delineation included data collected as part of the pre-design studies (AOC3) as well as bank compiled in AOC (from prior sampling). For samples collected below MHHW (such as the AOC3 bank data), data were included in the interpolation to define RAL exceedance areas. Any data from samples above MHHW will be considered source information.</p>

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69.	4.2.2	Pdf 46	The report states that delineation of banks and topographical surveys will be done in areas with RAL exceedances where dredging or partial dredge and cap may be needed. Add that it is also necessary to include areas where ENR applies (an unarmored bank that is unstable/erosive could serve as a source of recontamination to an adjacent ENR remedy).	<p>Topographic surveying is planned for all bank areas with RAL exceedances and will extend 50 ft beyond the Phase I interpolated RAL exceedance boundary. See Section 4.2.3. and the Survey QAPP Addendum.</p> <p>In addition, all RAL exceedance areas with banks have Phase II sampling proposed near the banks.</p>



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72.	4.3 Vertical RAL Exceedance Delineation in Sediment (DQO 12)	Pdf 47	<p>This includes a very definitive statement that only pre-design data will be used, and ONLY in dredge areas will vertical characterization be needed. Language like this is out of place in a data evaluation report, and EPA would like to discuss the purpose of this narrowing language.</p> <p>“Areas that do not exceed the RAL based on the design dataset will be considered vertically bounded.” Revise to use appropriate terms. The term ‘bounded’ implies that something is being bounded. The interpolation is currently the basis for defining <u>areas</u> assumed to have concentrations above the RAL, and QAPP Phase 2 sampling is designed to bound those areas. If the sampling effort was designed to refine the boundaries of clean areas, how would it differ, if at all? Ultimately, the ROD is clear about where RALs apply, but if a dredge area has contamination at depths below RAL intervals and adjacent areas are not well characterized, LDWG should consider and account for uncertainty in the dataset, the conceptual site model as locally applied, and the potential for construction surprises. It may be necessary to verify that “clean” samples adequately represent areas outside the RAL exceedance area footprint.</p> <p>State whether Phase 2 data could change the technology assignment. If so, might vertical data be needed in areas that are mixed or do not include dredging? What is the impact of waiting for Phase 3 to get this information, if needed?</p> <p>This section mentions characterization at the edges of ENR areas. Is the rest assumed to be MNR areas or do MNR edges need characterization?</p>	<p>The sentence EPA quotes was slightly different and had a different context. The DER text states “Areas with subsurface intervals that do not exceed the RAL based on the design dataset will be considered vertically bounded for the RD.”</p> <p>The Phase I DER is not being revised, so no revisions will be made. However, for clarity, the sentence was not intended to imply that the RAL exceedance area was vertically bounded from a vertical contaminant concentration standpoint. Instead, it implied that the area was vertically bounded for design purposes since the ROD does not require deep dredging if the 0-45 or 0-60 subsurface intervals did not exceed RALs. See response to QAPP Addendum comment 20.</p> <p>LDWG acknowledges that Phase II data could change technology assignments, and has considered this scenario in the addition of Tier 2 sampling locations in the draft final QAPP Addendum.</p> <p>LDWG is looking at MNR &gt; SCO areas and locations with &gt; SCO and &lt; RAL and will share this information with EPA for discussion when it has been compiled.</p>

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78.	4.5.3 Debris	Pdf 50/51	Clarify that bathymetric survey data can provide an initial debris assessment for large debris, but that smaller or deeper debris may need to be managed during construction. How will debris under structures be assessed?	Bathymetric survey data are considered adequate to identify large surface debris. Similar to any dredging project, small debris and buried debris will be managed during construction and specifications will address how to handle encountered debris. Large debris may be noted on the bathymetric survey that covered areas under structures. Buried debris or small debris management will depend upon the remedial technology(ies) implemented in those areas.
79.	4.5.4 Waste Char.	Pdf 51	State where the waste characterization approach will be described and when it will be provided for EPA review.	The waste characterization approach is described in the draft final QAPP Addendum, Section 5.3.3.
81.	4.6 Summary of Data Gaps	Pdf 52	The rationale categories don't include any acknowledgement of uncertainties caused by spatial variability. Include text that states why the areas not identified as RAL exceedance areas are adequately characterized.	The purpose of the categories was to summarize how RAL exceedance areas were defined in the Phase I DER. The categories are no longer relevant as the draft Phase I DER is not being revised. The QAPP and QAPP Addendum define the sampling approach, which is based on existing data, source locations, and recovery categories.
82.	Table 4-7 GENERAL		The following comments may duplicate or conflict with EPA comments on the QAPP Addendum for Phase 2, which are in preparation.  The table should be revised to address the comments below, but please add a note repeating the qualifier in the text that the DER version is preliminary.	See response to Comment 5.
83.	Table 4-7	47	Area 4– please confirm why column 3 (surface sediment RAL exceedance) state “No”. It appears sample LDW20-SS123 (2020) collected at 0-10cm had a PCB EF of 1.4. Should this field state “Yes”?	Location 123 is in Area 5. No change needed.
84.	Table 4-7, General	47-51	Identify areas that will need adjacent bank characterization in the recommendations column (17).	Column 17 has been deleted from this table. All Phase II sampling locations are shown in the draft final QAPP Addendum.

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85.	Table 4-7, General	47-51	It's not clear if Phase 2 sampling plans will address those areas where Phase 1 sampling encountered refusal during core collection (e.g. sample 148 in Area 9; samples 201 and 417 also encountered refusal but did not have RAL exceedance as and thus do not appear to present data gaps?).	See response to comment 17. Location 417 (Area 37) is near a Phase II vertical extent core.
86.	Table 4-7, General	47-51	While the recommendations column (17) provides general directionality for lateral bounding, there are no clear rules stated in the document to guide these bounding decisions or the degree to which bounding is required.	Column 17 has been deleted from this table, which is now provided in QAPP Addendum Attachment F. All Phase II sampling locations are shown in the draft final QAPP Addendum.
87.	Table 4-7, Area 'N of upper reach'	47	Area "N of Upper Reach" at RM2.9W –Confirm why the vertical extent data gap marked as "No". Depending on the technology assignment, a 100ft buffer on the northern boundary may not be sufficient to ensure adequate information to complete design. While 100ft may be sufficient for design of an ENR technology assignment, implementing a dredge or dredge/cap technology may require additional characterization to ensure sufficient information is available, especially if this N of upper reach Area is contiguous with Area 1. A possible solution is to consider going beyond 100ft and collecting archive samples in Phase 2 so that this data collection does not get delayed to a Phase 3. Also consider collecting samples within the N of upper reach Area in case multiple technologies are employable in that area, as identified in column 8.	Vertical extent will be addressed by locations 506 and 507 in Area 1.  Tier 2 locations (3) have been added near the 100 ft line in the draft final QAPP Addendum.
88.	Table 4-7, Area 1		Column 10 indicates data gap for both 0-45 and 0-60 cm in this subtidal area. Why would there be a need to collect 0-45cm in this subtidal area?	0-45 cm sample is bounding Area 1 to the W (in the intertidal).
89.	Table 4-7, Area 4	47	Confirm why column 3(surface sediment RAL exceedance) state "No". It appears sample LDW20-SS123 (2020) collected at 0-10cm had a PCB EF of 1.4. Should this field state "Yes"?	See comment 83. Location 123 is in Area 5.
90.	Table 4-7, Area 5		Basis for Column 17 unclear. Bounding to the N and S only around the bridge?	Column 17 has been deleted from this table. All Phase II sampling locations are shown in the draft final QAPP Addendum, including five Phase II locations near the bridge.

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91.	Table 4-7, Area 6		Agree that surface interval is the data gap but why bounding only to the N?	Based on discussions between LDWG and EPA on the draft final QAPP Addendum, no additional sampling is needed to define Area 6.
92.	Table 4-7, Areas 8 and 9	47	While the RAL exceedances for Areas 8 and 9 are both in the subsurface, additional surface sampling (0-10cm) should be proposed for the area below -18ft, as this presents a data gap for the area.	In Phase II, a 0-10-cm sample has been added in between Areas 8 and 9.
93.	Table 4-7, Area 10		Include bounding to the N, too.	A Phase II sample location has been added to the northern boundary of Area 10.
94.	Table 4-7, Areas 11, 13, and 24	48-49	The recommendation for these areas (11, 13, and 24) states that they will be "re-sampled". Does this include depth intervals that were already analyzed in Phase 1? Consider adding surface samples to the E of the interpolated Area 11 and Area 13.	Phase II sampling includes re-occupation of USACE core locations in Areas 11, 13, and 24, and will include collection of interval with the RAL exceedance and deeper. A 0-60-cm sample has been added to the NE of Area 13. Coverage of the surface sediment is sufficient in this area (11 samples between Areas 11 and 13).
95.	Table 4-7, Areas 9, 11, and 13	47 and 48	For shoaled areas with RAL exceedances at depth, consider the need to bound contamination laterally around these shoaled areas. If contaminated intervals in the shoaled areas align with depths of interest in sediment adjacent to the shoaled areas, consider adding bounding samples.	Three shoaling bounding samples have been added in Phase II (one between Areas 10 and 11 and two in Area 13).
96.	Table 4-7, Area 15	48	Area 15 only identifies bounding to the north. Add bounding to the west and south.	Three bounding locations for Area 15 will be sampled during Phase II (N W, and S).
97.	Table 4-7, Area 16	48	Area 16 only proposes subsurface bounding. Add surface bounding samples (that are possibly archived) given the 1997 surface exceedance at R17.	A surface bounding sample will be collected in Phase II on the northern boundary of Area 16.
98.	Table 4-7, Area 17	48	For Area 17, it's not clear what the mechanism will be for identifying a subsurface hit (Column 11) and if bounding will be needed for subsurface. Column 17 should include subsurface sampling, too.	Column 17 has been deleted from this table, which is now presented as Table F-1 in the draft final QAPP Addendum. For Area 17, three locations will be sampled in Phase II including surface, subsurface (0-60 cm), and an archived vertical extent core.

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99.	Table 4-7, Area 21	49	For Area 21, suggest reoccupying and conducting toxicity test. This location has an isolated zinc exceedance at EF 1.2. Collect bounding samples in Phase 2 for tiered analysis if the sample does not pass the biological test.	In QAPP Addendum, proposing re-occupation and conducting toxicity test if exceedances. Location is already tightly bounded.
100	Table 4-7, Area 30	47	There was only 1 subsurface sample collected in that area. Add that there's a need to vertically delineate closer to the shoreline.	In Phase II, six locations will be sampled to refine Area 30, including Tier 2 vertical delineation near the RAL exceedances (should dredging be required).
101	Table 4-7, Area 34	50	Toxicity test is identified as "potentially" needed. Either state that a toxicity test will be performed or clarify what additional information is anticipated to inform the need for a toxicity test.	In the draft final QAPP Addendum, it is stated that toxicity testing will be performed.
102	Table 4-7, Area 37		Explain why this area is numbered as one area when it's really a collection of small individual areas.	Area 37 was considered one combined area for the DER to simplify the DER tables and evaluation. The numbering system used for the DER will likely change in 30% RD as engineering and constructability issues are factored into developing Remedial Action Areas.
103	Appendix B and 2.1.2.3	App B and p 12	See "available via CD upon request" comments above. Clarify in the DER that this information is not in the appendix but is available upon request.	See response to DER comment 19.
104	Appendix C	Work sheet table	4 filterable and empty columns are on the far right of table. Remove from table.	This change was made in the Phase I Excel file posted on ldwg.org and attached to the draft final QAPP Addendum in Attachment A.
105	Appendix C	Work book	PDI Phase 1 table fields list doesn't match with the field reference list included in the excel file (appears for SCO2015 and CSL2015 related fields). Resolve the differences.	The field reference provides descriptions of all fields associated with sediment data provided in the LDW database. Not all fields are relevant for every data table, and those that are not applicable can be disregarded. The Phase I data tables have been uploaded to ldwg.org and are included in Attachment A of the draft final QAPP Addendum. No changes made.
109	Appendix H		Data Management Rules. Identify in the introduction which of the subsections articulate a change from the RI/FS data management rules.	Appendix H has been revised to articulate these changes in the introduction of Attachment D to the QAPP Addendum.

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110	Appendix I Section 2.3	I-4	<p>First bullet: The use of median comparisons seems like a stretch. Indicate the high PCB sample locations that raised the recent average. Does this suggest an ongoing source?</p> <p>Second bullet: "Average arsenic concentration showed minimal changes over time... <i>indicating</i> that concentrations <i>are in equilibrium</i>." A change from 12 to 13 is close to a 10% increase. The italicized text isn't supported: qualify or cut.</p>	<p>Addressed in QAPP Addendum Attachment C (updated version of DER Appendix I).</p> <p>First bullet: Discussion of the two high PCB concentration samples has been included in Attachment C of the QAPP Addendum (former Appendix I to the DER). Additional data are being collected in this area as part of Phase II.</p> <p>Second bullet: The means and standard errors for the 44 resampled locations were 12.4+/-1.2 mg/kg and 13.0 +/-1.1 mg/kg, which are not significantly different. Footnote added to the text.</p>

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111	Appendix I, Section 2.4, Recovery Category Evaluation Area 3	I-6	<p>RM 3.9 to RM 4.05(E). The text states, "...the increase in PCB concentration may have been caused by a one-time localized disturbance during construction." Include in the text if recent bathymetry or any other information can confirm this assumption.</p> <p>Table 23 of the ROD notes that increasing PCBs <u>or</u> increasing concentrations of other detected COCs that exceed the SCO ( &gt; 50% increase) warrants reclassification as Recovery Category 1. EPA recognizes that the AOC3 Recovery Category Recommendations Report (2019) and the FS Appendix D it cites used a higher threshold (all COCs increasing) for changing an area to RC1. Given the ROD language in Table 23, consider the effect of changing the area being recommended for RC2 to RC1 instead.</p> <p>The change to RC1 could extend further north than the evaluation area indicated, based on rising PCB concentrations. Similarly, there is an area near Norfolk that has increased PCB concentrations. What physical information in any of these areas suggests that they are likely to recover naturally? Is there measurable deposition or erosion? an ongoing source? Review bathymetric findings and morphology.</p> <p>RM 4.15 to RM 4.25(E).</p> <p>Add text regarding change/lack of change in bathymetry observed in Slip 6.</p>	<p>Comments addressed in draft final QAPP Addendum Attachment C (updated version of DER Appendix I).</p> <p>RM 3.9 to RM 4.05(E): interpretation of bathymetric data and satellite imagery has been added.</p> <p>Based on additional review and discussions with EPA, the area near LDW20-SS257 and LDW20-SS266 will have 3 sample locations re-occupied to further understand recovery trends. Recovery category recommendations will be presented in Phase II DER.</p> <p>The Norfolk area was not surveyed in 2003 because of the shallow water depths so a bathymetric comparison could not be made to 2019 data. The morphological and chemical evidence indicate that the area is consistent with less certain natural recovery (Recovery Category 2), as presented in the Appendix. The observed increase could be due to heterogeneity or potentially ongoing sources; source control measures in this area are ongoing. No change made to the text.</p> <p>RM 4.15 to RM 4.25(E). Text has been added. The main portion of Slip 6 is depositional (more than 2 ft deposition from 2003 to 2019).</p>

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112	Appendix I, Table I-3		There are three sample locations at RMs 3.9, 4.0, and 4.9 where the percent change in concentration for PCBs is greater than 100%, in some cases up to 500% increase, indicating a trend of increasing concentrations. While this appendix was mainly intended to inform recovery categories, consider this information when planning additional sampling during Phase 2. More bounding or intervals may be needed. given the potential for high heterogeneity that included increased concentrations over time.	Additional samples have been added at RM 3.9, 4.0, and 4.9 (near Areas 27, 30, and 37) in the draft final QAPP Addendum. See response to comment 111.



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113	Appendix J	1.1-1.4	<p>Rather than referencing the AECOM 2012 Final FS for the interpolation parameters used, include more detail/information in Appendix J on interpolation, methods and justification. As is, it is difficult for the reader to see the justification of the methods used, and how/why it differs from AECOM 2012 methods.</p> <p>Appendix J 1.4 includes the justification that “For simplicity, Thiessen polygons were used to interpolate these COCs in areas where they had RAL exceedances”—what is meant by this? Time/labor costs? Sample size considerations? IDW was used for arsenic and cPAHs, and Thiessen polygons were used for dioxins/furans to account for the small sample size in the Final FS (AECOM 2012). Are Thiessen polygons used in the Phase I DER because the other COCs are interpolated <u>in areas where they had RAL exceedances</u>? And because of <u>this subsetting</u> the sample size is less for those COCs? This difference and justification are unclear in Appendix J.</p> <p>It takes a lot of digging to comprehend Appendix J, AECOM 2012 interpolation methods, and it is unclear whether and why it is appropriate for the Phase I DER interpolations to follow the same parameters for PCBs and at the same time deviate for all other COCs (with exception of dioxins/furans) by using Thiessen Polygon methods. At a minimum, these aspects of interpolation must be revisited with EPA prior to Phase II DER, as stated in 3.3.1.</p>	<p>As discussed with EPA on April 26, Appendix J was attached to the draft final QAPP Addendum (as Attachment E) in its current form. It has served its purpose of helping to identify Phase II data gaps.</p> <p>The interpolation approach will be discussed in more detail with EPA over the summer and finalized with EPA prior to preparing the Phase II DER. In the Phase II DER, the RAL exceedance areas will be presented using the final interpolation approach with the design dataset including the Phase II data.</p> <p>Text changes were made in the attachment to clarify why Thiessen polygons were used for chemicals other than PCBs.</p>
114	Appendix K		<p>Introduction: As noted in the main report, the bulleted list of remedial technologies for subtidal areas needs to include partial dredge and cap. Check that this omission was not a factor in the application of technologies that follows.</p>	<p>Omission of partial dredge and cap was unintended and was not a factor in the application of technologies (several subtidal areas show partial dredge/cap as a preliminary technology assignment option). Bulleted list will be updated in version of appendix included as Attachment F in the QAPP Addendum.</p>

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115	Maps 2-3a through 2-3e Maps 4-1a through 4-1i		The maps show the locations of cores without appropriate RAL intervals. If these data have been considered, as is appropriate, present the information graphically (with location IDs, e.g.) and in the describe in the text of the DER how the data were taken into account.	The locations with cores without appropriate RAL intervals (and associated data) have been included in Attachment A of the QAPP Addendum and were considered in the placement of Phase II sampling locations.
117	Map 2-2		Can you include the year of sampling in the map title (perhaps, in parentheses after the title)? It is possible that someone would find the map folio without the text doc and not be able to determine the year that Phase I PDI samples were collected.	Sampling year added to Map A-4 in Attachment A of the QAPP Addendum.
118	Map 2-3 and beyond		Map 2-3a onward: Make it clear that data with a callout box showing EFs are only those from the 2020 dataset (Phase I PDI), not prior results.	Sampling year added on left panel of Map A-5 series in Attachment A of the QAPP Addendum.
120	Maps 2-3e and 4-1i		Maps 2-3e and 4-1i: Clarify what “Boeing South Storm Drain Area” means. You may consider adding “Dredged” before “Area” or another term.	Terminology updated to “Boeing South Storm Drain Removal Area” on Map A-5e of QAPP Addendum and others.
121	Maps 2-3e and 4-1i		Maps 2-3e and 4-1i: Review the private storm drain outfalls shown in Segment 4 (east side) and confirm with Boeing if some of those outfalls listed as active have actually been decommissioned.	Confirmed that private outfalls shown on east side of Segment 4 have not been decommissioned. No change needed.

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123	Map 2-6c		What might have caused the deeper area adjacent to RM4.5W? Similarly, the green area adjacent to Norfolk.	<p>LDWG does not know what caused the depression area along the western shoreline at RM4.5W. However, the isopach map (QAPP Appendix B) shows that the depression area has experienced more than 2 feet of deposition between the 2003 and 2019 bathymetric surveys.</p> <p>At Norfolk (Area 37), it appears EPA is referring to the small green area with deeper bathymetry located on the east shoreline at approximately RM4.88E. There is an existing flow diversion structure located at this location. There are similar flow diversion structures located downstream of the Oxbow Bridge (RM 4.8) where the bathymetry data also show deeper elevations due to higher flow velocities in the vicinity of these flow diversion structures.</p>
124	Map 2-6d		Better differentiate between the symbol for overwater structures and the EAA boundaries. We know which ones they are, but it would not be obvious to someone less familiar with the area.	The symbology has been better differentiated in Map B-2d in the QAPP Addendum.

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125	Map 3-1		<p>The green quarter circles indicate that neither older or more recent sample was detected above SCO or RAL for that contaminant. It would be a good check step to assess whether there was 50% or more/less change in concentrations. Would it be reasonable to assume they should at least change in the same direction as the others? And if such changes were observed, RAL exceedance or not, might the RC2 area be expanded to the south? Certainly, if the areas that were not adjusted from RC3 to RC2 (adjacent to the Former Rhone Poulenc facility) showed increases or did not show decreases (RAL notwithstanding), this might suggest that they are not recovering as one might expect in RC3 areas.</p> <p>State the effect, if any, of changing from RC3 to RC2?  NB: there's a green teardrop (where there's a dolphin) and a yellow trench in the category 1 area. Are these likely artifacts caused by survey limitations?</p>	<p>This comment was made in the pre-design studies recovery category report and it was agreed that concentrations below the SCO or RALs are generally too low to be helpful in this analysis and were not used in previous analyses and thus were not included in the maps and tables.</p> <p>Applicable RALs and technologies would not be affected by a change from Recovery Category 3 to Recovery Category 2 and suggest that no change is warranted at this time.</p> <p>The green teardrop appears to be accurate bathymetry data.</p>

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127	Map 3-4a and others		<p>The gaps between RAL Exceedance Areas on the cross sections are often fairly small. Practically speaking, considering potential sloughing downslope, how will these be dealt with? For example, at STA 204+00, there's 25 – 30 feet between three parts of Area 8, within the navigation channel. Are there really three lobes in Area 8 or is Area 9 mislabeled? The lobe labeled as Area 8 to the west of the two lobes of Area 8 in RC1 is upslope of and may have higher PCBs (RC2 RAL is higher). How will sloughing be addressed?</p> <p>In STA 100+40, there are 'shoaled' areas of the BP2 Early Action Area: is this new material since the EAA was completed or part of the EAA backfill? Do the 2007 and 2019 bathymetric maps (or surveys performed by Boeing) show new accretion? Who will be responsible for dredging these areas and what impact might dredging have on the EAA slope stability?</p> <p>The east side of STA 233+00 shows a gap between two parts of Exceedance Area 24. The plan view on Map 4-1d doesn't seem to have that, unless it's an artifact of the zig-zag line between RC1 and RC2 areas. Either way, this is another case of "does it make sense to assume it's clean?" (There's no sample identified in the gap.)</p>	<p>Addressing design level decisions is more appropriate for 30% RD. 30% RD will take the new interpolated boundaries using the updated design dataset, assign remedial technologies, overlay engineering considerations, and then define remedial action areas, that establish the boundaries for remedial action. Side slopes will be defined in 30% RD using geotechnical data collected in Phase II PDI. Remedial technologies selection will also dictate what is reasonable and constructable. The decision on whether current gap areas make sense to include in RAAs won't be evaluated until 30% RD.</p> <p>Note: Leftmost "Area 8" lobe on STA 204+00 was mislabeled, should be Area 9. This has been corrected in Map F-1b of the QAPP Addendum.</p> <ol style="list-style-type: none"> <li>1) The boundary at Area 24 has been set at the FNC, so that gap is now in Area 23.</li> <li>2) The area east of the gap is defined by a BBP surface sediment Thiessen polygon, not either of the PCB interpolations.</li> </ol>

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128	Maps 4-1 (all)		<p>The note says RAL exceedance factors listed are based on the ROD RALs, but the maps show RAL exceedance <b>areas</b> based on ROD RALs and the proposed RAL for cPAHs. This is confusing. Either show cPAH areas per ROD RALs or show the note.</p> <p>Include information as a note on these maps about the source of the cores (RI/FS cores, or other sources?) and note that the data for the cores without appropriate RAL interval were evaluated – to assess the potential for missing areas of contamination-- and accounted for in the QPP sampling approach, if so.</p> <p>Include the map and data table LDWG provided separately for the cores without appropriate RAL intervals in an appendix.</p>	<p>RAL exceedance areas based both sets of cPAH RALs are now shown in the QAPP Addendum maps.</p> <p>The purple square data and map for cores without RAL intervals have been included in Attachment A of the QAPP Addendum.</p>
129	Maps 4-1 (all)		<p>Add a note to the maps that explains how RAL exceedance areas like 4 exist (an artifact of the change in recovery category and associated RAL) and reference text discussion.</p> <p>4-1a shows a blue hole in the pink area north of RM3. This defies logic. Include a note on these figures noting that these areas will be adjusted based on Phase 2 data and engineering considerations.</p>	<p>Interpolation-only areas have been described in the text in the draft final QAPP Addendum (see Section 4.1.1). Actual remediation areas will be defined in RD. Notes have not been added to the already very full maps.</p>
130	Map 4-1a		<p>Map 4-1a: It appears that the total PCB EF for sample location LDW 18-SS-118 (2018) is 1.0. If so, it should be in green text.</p>	<p>Exceedance status is correct (text should be red and not green based on sig figs). No change made.</p>
131	Map 4-1a		<p>Map 4-1a. Sites 1, 2, 3, 5 on the east side of the river have a straight line along Boeing Plant 2. Label the gray EAA area clearly, as it can be mistaken for a bank.</p> <p>Should Area 1 encompass the LDW20-SC100 sample? Given the results near the RAL at SC119 and SC117, samples with EFs of 0.9 – 1 should be included or confirmed. Areas on the west of Boeing Plant 2 EAA in this segment are generally elevated.</p>	<p>The Boeing Plant 2 EAA has been clearly labeled on Map 4-1a.</p> <p>The interpolation was limited to extent only to RM 3.0 (the northern boundary of the upper reach). A note has been added to Map 4-1a that the northern boundary of the upper reach will be determined in 30% RD based on the design dataset including Phase II data to be collected north of the boundary.</p>

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132	Map 4-1b		<p>Map 4-1b. SC-15 has an EF of 0.98 for PCBs, above a purple square. The DER needs to show how data for deeper intervals was considered.</p> <p>Legend for white area is '&lt; -18 ft MLLW'. Change to read "deeper than", as -17 ft MLLW seems less than -18.</p> <p>West of Area 5 is a potential vessel scour area in the navigation channel that weaves south. There are no samples from this area (apart from a purple square core). Is this a data gap?</p> <p>Area 12 has a bite out of it. EPA assumes that this and similar irregularities in area outlines will be resolved by engineering considerations.</p>	<p>The white area legend has been revised in the QAPP Addendum maps as requested.</p> <p>All sampling location comments have been addressed in the Map 4-1 series in the draft final QAPP Addendum, per discussion with EPA.</p> <p>EPA is correct to assume that Remedial Action Areas will be defined considering remedial technologies, equipment capability, and engineering considerations.</p>
133	Map 4-1c.	29	<p>Why is there a white gap north of Area 15, when there's not a &lt;RAL sample providing the basis for the boundary?</p> <p>On the north side of Area 17, consider the uncertainty in the EF of 0.92. If it were found to exceed the RAL exceedance during construction, the lack of nearby data might be an issue. Consider whether this is a data gap.</p>	<p>Bounding samples have been added to the north of Areas 15 and 17 in the draft final QAPP Addendum.</p>

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134	Map 4-1d	30	<p>Map 4-1d. The blue pockets on the east side seem unlikely to survive engineering decisions. A disclaimer footnote would be helpful. For Area 29 and Area 30 the gap seems arbitrary.</p> <p>The RC1 area on the east side seems to coincide with the transition to subtidal. The PCB concentrations in the intertidal zone, which is RC2, are pretty high (AN041 has 1000 ug/kg dw). If they are not removed, what is the likelihood that they will later affect adjacent downslope subtidal areas.</p> <p>Area 27 includes a PCB RAL EF of 20. The blue area to the west seems likely to be close enough to be affected, despite the intertidal sample.</p> <p>It seems Area 28 should extend further to the south and the west.</p> <p>Where is the property line for National Industrial holding? If the area closer to shore next to the property were RC1, what would the effect be? For example, the upside-down triangle: is it greater than 12 mg/kg OC PCBs?</p>	<p>See response to DER comment 129.</p> <p>The gaps in the RAL exceedance areas are not arbitrary; they are driven by interpolation of the data.</p> <p>See response to comment 127 regarding engineering decisions.</p> <p>The interpolation is based on all of the design data, including location 256, which did not have a RAL exceedance just W of Area 27.</p> <p>There are no RAL exceedances west of Area 28. The PCB concentration at the upside down triangle W of Area 28 is 6.2 mg/kg OC (WIT264). Bounding samples to the S and E have been added in the draft final QAPP Addendum.</p>



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135	Map 4-1e.	31	<p>Area 31 is irregular, with holes and bits out of the edges. Despite having the highest EFs in the upper reach – PCBs at 17, dioxin/furan at 13, for example—the boundaries based on interpolation are constrained by (mostly older) samples below RALs. What conceptual model supports this?</p> <p>LDW20-SS313 has a RAL EF of 4.3. But because there are adjacent samples below RALs, Area 31 has a bite out of it. This spatial variability seems important. Does it make sense to draw the line where it is?</p> <p>Consider analyzing sample 231 from Phase 1 for arsenic. The core (purple square) in the RC1 area has arsenic at 28.9 mg/kg at 2-3’.</p>	<p>The remediation boundary in the Area 31 area will be determined during RD based on extensive data on this stable mudflat.</p> <p>Arsenic will be analyzed in the archive sample from Phase I location 321.</p>
136	Map 4-1f.	32	<p>Previous data for Slip 6 were above RALs in many samples. Apart from the small area shown, recent samples are just below the RAL. Given the uncertainties, consider getting Phase 2 data to confirm areas that are 0.9 to 1 EF. This may reduce the risk of volume increases during construction. Vertical characterization would help provide information about what may be left below the surface and may be exposed to tug scour in the future.</p>	<p>As part of Phase II, horizontal bounding data and vertical extent data are being collected for Area 32 in Slip 6.</p>
137	Map 4-1g	33	<p>What is in the (purple box) core west of Area 33? Is this an area where bank investigation is needed?</p>	<p>The purple box is LDW-SC54 with PCB concentrations of 7.2 mg/kg OC in 0-2 and 2-4 ft intervals. No additional sampling beyond that proposed Phase II sampling in the interpolation-only Area 33 needed is in this area. Phase I archive location 358 is being retained as a potential Tier 2 analysis if needed.</p>

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138	Map 4-1h.	34	Area 36 and Area 34 are, clearly, based on interpolated concentrations crossing into RC1 areas. Add a note to all of the maps in this series regarding the source of the RC1 areas and noting that final remediation areas will make conservative dredge prisms considering engineering and accounting for RC1 boundary uncertainties.	Remediation boundaries will be established in RD.  In Phase II, samples are being collected from 11 locations in Areas 34 and 36 to further refine these areas.
139	Map 4-1h:	35	Area 35 should include LDW20-SS-384 or explain why it doesn't. The note cites ROD Table 28. Ensure that horizontal delineation samples are located in the cove during Phase II sampling.	Location 384 (0-10 cm) has a cPAH EF of 2 relative to the ROD cPAH RAL. An orange RAL exceedance area that includes this location has been added to the draft final QAPP Addendum. In addition, the 0-45-cm archive sample from this location is being analyzed as part of Phase II.  In addition, three bounding samples are being collected around Area 35 in Phase II.
140	Map 4-1i:	35	LDW20-SS416 (2020) has a PCB EF of 7.2 in the surface sediment. The location is within the Boeing South Storm Drain cleanup area. Why is it not counted in Area 37? This section needs to be carried forward to Phase II PDI.	Location 416 is included in Area 37. The layers were transposed on Map 4-1i to show the RAL exceedance area (Area 37) on top of Boeing South Storm Drain Area and the RAL exceedance area and the Norfolk EAA in order to best locate the bounding samples.
141	Map 4-1i.	35	Given pre-EAA concentrations and the magnitude of EFs near the Norfolk outfall EAA, thorough horizontal and vertical characterization is warranted to ensure that this area is cleaned up to be protective and protected.	In Phase II, 10 locations are being sampled in the vicinity of Area 37 in the Norfolk area.